



During the past few years, increasing numbers of campers, backpackers, anglers and hunters have been stricken with waterborne diseases because they drank water straight from streams, springs or lakes. Even though the water appears to be sparkling clean and pure, it may contain microorganisms which cause disease.

Two organisms found in many waters are *Giardia lamblia* and *Cryptosporidium parvum*. Since these parasites have been found in many wild and domestic animals, they can be present even in remote areas, regardless of whether there are humans around.

These organisms are transferred between animals and humans by means of excreted fecal material. If the infected animal or human defecates in or near a stream or the feces are introduced as a result of untreated sewage or rainwater runoff, the organisms are then spread through the water.

Drinking water containing these parasites can cause *Giardiasis* or *Cryptosporidiosis*. Both are severe gastrointestinal disorders which may result in diarrhea, headache, abdominal cramps, nausea, vomiting and a low grade fever. People with degraded immune systems (due to AIDS, chemotherapy, or an organ or bone marrow transplant) should be aware that a *Cryptosporidium* infection can be life-threatening.

The best means of preventing infection from *Giardia* or *Cryptosporidium* is to not drink naturally occurring water, regardless of how pure it looks. This means that, when hiking or camping, you should either carry all your own water or disinfect the water before drinking it.

Boiling is the safest of available water disinfection methods. It kills *Giardia*, *Cryptosporidium*, bacteria and viruses. Research has shown that, at sea level, boiling water for one minute effectively eliminates these hazards, although vigorous boiling for 2-5 minutes is generally recommended for *Cryptosporidium*. At higher elevations, water boils at lower temperatures and longer boiling times should be observed (e.g., 15 minutes at 10,000 feet).

These organisms can also be removed by filtration. To be effective for *Cryptosporidium*, however, the filter must be capable of removing particles of one micrometer or less in diameter.

Chemical disinfection, generally with the use of chlorine or iodine, is another method of preventing infection from *Giardia* and most other microorganisms. *Cryptosporidium* parasites, however, are highly resistant to most chemical disinfectants and can only be neutralized by boiling or filtration.

The table below lists the various disinfectants available and the recommended dosage per quart of water. The use of saturated iodine (made by dissolving iodine crystals in water) is not recommended because it does not kill all of the *Giardia* organisms in cold water. None of the below-listed disinfectants are considered to be effective against *Cryptosporidium*.

WATER DISINFECTION METHODS		
Disinfectant	Quantity per Quart of Water	Waiting Time Before Drinking
Chlorine Tablets	5 Tablets	30 Minutes *
Household Bleach	2 Drops **	30 Minutes
Iodine Tablets	2 Tablets	20 Minutes *
2% Tincture of Iodine	10 Drops	20 Minutes
Saturated Iodine	Not Recommended	

* When using tablets, the waiting time begins after the tablets are dissolved

** Use 4 drops if water is cloudy or turbid